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Stamping Device

The invention relates to a stamping device for stamping identification data, especially in the form of code numerals, in plastic products such as containers which have been produced preferably by a blow-fill-seal process.

Processes and molding devices for production of containers have been disclosed in the prior art (DE 199 26 329 A1), ones in which a tube of plasticized plastic material is extruded into a molding device, one end of the tube is closed by welding, and a pneumatic pressure gradient acting on the hose is generated to expand the hose and is applied for the purpose of forming the container on a shaping wall of the molding device consisting of two form tools positioned opposite each other. A suitable filling mandrel is then used to fill the plastic container under sterile conditions, and after the filling mandrel has been removed the container is hermetically sealed, a definable head geometry being formed. Two container shaping jaws are moved toward each other by hydraulic or electromotive drive means to obtain a closed position and away from each other and into an open position in order to obtain the plastic container itself in which fluid is subsequently stored.

The head geometries to be generated by means of the two separately controlled jaws also generally include the neck element of the plastic container, including one in the form of an ampule, which, closed by a head piece, may be opened at a separation point for removal of fluid after the head piece has been separated by way of a toggle element molded on it over the separation point and thus removed from the plastic container proper.

Processes and devices for execution of these processes have been disclosed in a plurality of embodiments and are widely used in packaging systems for liquid or paste products, as for example in the well-known bottelpack® system.

EP 0 359 971 B1 discloses a comparable blow-fill-seal process for production of hollow containers of plastic, ones for which two halves are molded and welded together in a tool. A frame-shaped hollow element is molded and welded in the same way as the containers themselves from a waste edge zone of the containers (ampules), said containers being configured in sequence in a strip.

In the case of the disclosed processes indicated in the foregoing the possibility exists of applying identification data, especially in the form of code numerals, which among other things may permit drawing of conclusions regarding the place and date of production, the contents, and the amount contained in the respective container, including any expiration dates of the contents of a container, either on the toggle element itself by way of which the sealing head piece is separated from the container itself for the process of removal of the contents or in the area of the edge waste zone which surrounds the respective container and may be sold with the respective container as a sale unit. The respective identification data, which may also be present uncoded as information for end users but which are predominantly present in coded form for presentation of information content to producer and intermediate purchaser circles, are applied in the

disclosed processes in the production machine itself. The code numerals are fitted into the molding halves before the blow-fill-seal process is carried out so that the code numerals may be impressed into the respective container directly in the molding process. Since the production machines involved may easily have ten or more single-use molds, it may take several hours or even an entire day to replace the code numerals in the form of die plates or individual type which are to be fitted into the mold. Such expenditure of time is necessary in particular if one production machine is to apply different code numerals to the various molds as required by the production process. Since application of the code numerals inside the molds by hand is a very complicated process, it is also possible that a single error, such as application of an incorrect code numeral in the mold, may make it necessary to halt the production process and dispose in their entirety of all the containers produced up to that point by the production machine in the process. In such exchange processes the machine for producing the containers is not available, and this results in high operating costs.

On the basis of this prior art the object of the invention is further to improve the processes and devices as described to the end that an exchange process with respect to the identification data for plastic containers may be carried out in a simple and cost-effective manner, and especially so that the production process itself for plastic containers is not impaired as a result. The object as thus formulated is attained by means of a stamping device having the characteristics set forth in claim 1 in its entirety.

The stamping device claimed for the invention for stamping identification data, especially in the form of code numerals in plastic products such as containers produced by a blow-fill-seal process, is characterized in that in a frame of the device at least one stamp having a stamping unit with replaceable identification data is mounted so that it may be displaced horizontally and when in a raised position permits movement to it and away from it of the products which are to

be stamped or have been stamped and when in a lowered position effects stamping of the products.

The stamping device in question is mounted outside the production machine proper for execution of the blow-fill-seal process and the containers are first fully produced, filled, and sealed before they are moved further to the stamping device for stamping of identification data. The stamping device claimed for the invention with its frame structure and the stamp permits very high rates of output of goods to be stamped and, as a rule, the stamping process may basically be disconnected from the production process proper in time and space by way of the stamping device. In addition, because of its frame structure the stamping device is very easily accessible from the exterior and a process of exchange of identification data for the containers (ampules) in rapid succession and with little adjustment effort may be achieved. The latter is a factor in particular if, as a result of incorrect selection of code numerals the stamping processes must be interrupted and the incorrect code numerals replaced with the correct ones. From the viewpoint of safety engineering the stamping device is easy to control and when supplemented by safety engineering system elements may help prevent hazardous conditions for operating personnel.

In one preferred embodiment of the stamping device claimed for the invention the plastic material and/or the stamping unit is/are heated for stamping of the identification data. Thus, the residual heat of the plastic product following application of heat and pressure in the process of its production may be used for stamping by the stamping unit. It is also possible, however, to heat the stamping unit additionally to stamp the identification data required in the cooled plastic product with the heated stamping unit.

It has been found to be especially advantageous to deliver and remove the plastic product in the direction transverse to that of stamping with the stamp and to employ a stamp support supporting the plastic product, said stamp support being moved simultaneously with the stamp or desynchronized from it in the opposite direction of movement. This configuration makes it possible to operate the production machine at high speeds of output of plastic products safely and at the same speed of production as that of the machine.

In another preferred embodiment of the stamping device claimed for the invention provision is made such that the frame has columnar guides for longitudinal movement of the plate-like stamping unit and a support plate for the stamp. The frame structure of the stamping device is reinforced by the columnar guides, so that high accuracy may be achieved in stamping processes, along with clearly recognizable identification data. In addition, the stamping forces generated by the stamping process are reliably transmitted to the frame of the stamping device by way of the columnar guides. By preference provision is made such that the plate-like stamping unit and the support plate are adjacent to and face each other and the piston rods of the stamping plate and the support plate engage the associated plate and their housing element is rigidly connected to the frame. In this way the base structure of the frame with the columnar guides may be additionally rigidified by way of the housing element stamp configured as operating cylinder; hydraulic or pneumatic cylinders, as well as electric motor operators with spindle drives, may be employed as operating cylinders for the stamp and stamp support.

In another preferred embodiment of stamping device claimed for the invention there is present a guide plate connected to the frame by way of columnar suspension and mounted between plate-like stamping unit and support plate. This guide plate guides the plastic products for a stamping process within the frame. The guide plate makes certain that the plastic products to be stamped reach a precisely definable stamping position inside the stamping device and that

components not provided for stamping do not inadvertently undergo the stamping process and possibly are damaged. In addition, the guide plate together with the support plate serves as support for the plastic product during the stamping process.

In order to make it possible for the greatest possible number of stamping processes to be carried out with the plastic products, in one preferred embodiment of the stamping device claimed for the invention provision is made such that the plastic products in the form of ampules are configured as containers which, connected to each other in a strip by a (waste) edge zone, are stamped in succession, several adjacent ampules being provided simultaneously with the stamp.

The stamping device claimed for the invention is described in detail below with reference to the drawing, in which, in diagrammatic form not drawn to scale,

- FIG. 1 presents a side view of the basic components of the stamping device as seen in the direction of the arrow X in FIG. 2;
- FIG. 2 another side view of the stamping device claimed for the invention as seen in the direction of the arrow Y in FIG. 1;
- FIG. 3 a top view of a strip of (three) containers in succession with toggle elements as sealing pieces on the head side provided with identification data; the empty spaces identified by X may be provided with any desired code numerals or letters or also ones in decoded form.

The plastic product shown in FIG. 3 has three containers 10 interconnected in sequence in a strip by an edge zone 12, also of plastic. The interior 14 of the container 10 is filled with a

fluid such as one in the form of a pharmaceutical preparation or the like. A neck element 16 which is sealed by a toggle seal 20 by way of a separation point 18 serves as the opening of the container. The edge waste zone of flat plastic material possibly still present between edge zone 12 with neck element and the toggle seals 20 as shown in FIG. 3 is removed preferably by punching. The toggle seal 20 itself is configured to be flat and permits easy opening of the container 10 by manual separation (rotation) of the toggle seal by way of the separation point 18 from the associated neck element 16.

Use is made for such containers 10 of disclosed processes and molding devices (not shown), ones in which a tube of plasticized material is extruded into a molding device, one end of the tube is sealed by heat sealing, and, as a result of generation of a pneumatic pressure gradient acting on the tube, the latter is expanded and applied to a shaping wall of the molding device consisting of two opposite molding tools (not shown) for the purpose of forming the container. The plastic container 10 is then filled under sterile conditions in the molding device by way of a suitable filling mandrel (not shown) and, after the filling mandrel has been removed, is then hermetically sealed to form the definable head geometry illustrated in FIG. 3. Such processes and molding devices are of the prior art and are described, for example, in DE 199 26 329 A1 and in EP 0 359 971 B1 and accordingly will not be discussed further here.

Code numerals 22 are applied to the surfaces of the toggle seal elements 20; crosses or the letter X have been used as placeholders to indicate the spaces reserved for the identification data in the form of code numerals. In place of the placeholders indicated by X use may be made of any identification and manufacturing data which may provide information as numbers or numerals in coded form to experts at large, such as information relating to the place and mode of production and expiration dates and fluid contents, etc. The code numerals 22 in question may also provide information to end users in uncoded form concerning expiration dates, names of

manufacturers, or the like. The possibility also exists of dyeing the code numerals 22 so as to attract the attention of the user to the display field containing the identification data. In addition, illustrations such as pictographs, for example, may be used in order to indicate clearly that the contents or the like are to be administered only orally. Directions for use or parts of them may also be reproduced by stamping in the identification data field.

The stamping device by means of which identification data such as code numerals 22 may be applied to container elements will now be described in what follows with reference to FIGS. 1 and 2. Application of the code numerals 22 to the toggle seals 20 as shown in FIG. 3 is presented exclusively by way of example. Thus, for example, the identification data may also be applied to edge zones and waste edge zones in conjunction with the containers 10 or the identification data may be applied directly to the container 10 in areas which include the interior of the container 10 with its fluid or other medium. In the latter case the stamping processes are to be conducted with suitable care in order to prevent stamping through the container 10, something which might cause the contents of the container to be unusable. There is also a plurality of potential container configurations, including those of ampules or syringes, so that the exemplary embodiment shown in FIG. 3 represents only one option among a decidedly large number of alternatives for containers produced by the blow-fill-seal process.

The stamping device shown in FIGS. 1 and 2 for stamping identification data, especially those in the form of code numerals 22, in plastic products such as containers 10 or ampules produced preferably by a blow-fill-seal process, have a frame designated as a whole as 24 made up of longitudinal supports 26 and transverse supports 28; only part of the frame elements is shown in the illustrations, in order that the essential components of the device may be more clearly illustrated. The frame 24 may consist of longitudinal supports 26 and transverse supports 28, but may also be made up of individual spars which are welded together, joined by a threaded

connection, or riveted to each other and optionally further reinforced by crossarm braces 30 to form a kind of box-type frame in which the movable machine elements of the stamping device are received and fastened.

A stamp 32 with a stamping unit 34 is mounted in the frame 24 of the device. This stamp 32 is configured as a working cylinder and is provided with a retractable and extensible piston rod 36 the free end of which engages the plate-like stamping unit 34. The housing element 38 of the working cylinder (stamp 32) is mounted on a frame plate 40 which as viewed in the direction of FIG. 2 extends in parallel with the upper transverse support 28 and is held above the two longitudinal supports 26 a specific distance vertically from the transverse support 28. The stamping unit 34 has on its lower side identification data units 42 which are designed to be replaceable, that is, individual code numerals 22 or letters or even pictorial symbols may be replaced as individual type or die plates as parts of the strip of identification data. The identification data in question may be configured as groups of information content positioned side by side or one above the other so that the stamped image is in the form of an identification data field, as is shown in FIG. 3 for the plastic product, X identifying the empty space holders.

When the stamp 32 with stamping units 34 and identification data units 42 has been raised, the products such as the containers 10 to be stamped are placed in position in the stamping device and stamped products are removed from the stamping device. The stamping process itself is carried out with the stamp 32 lowered as shown in FIGS. 1 and 2; the identification data units 42 are then in contact with the identification data field, in this instance with the flat parts of the toggle seal 20 as illustrated in FIG. 3.

For the purpose of stamping the identification data the plastic product is heated as a function of production or the stamping unit 34 itself is heated by a heating unit not shown. In

addition, the direction of delivery and removal of the plastic product is indicated in FIG. 1 by an arrow Z, and accordingly unstamped products as viewed in the line of sight to FIG. 1 move from the left through the stamp 34 in the center of the device to be stamped and after being stamped move to the right from the stamping device for further handling, for example, to a packing machine (not shown). Consequently, the direction Z of delivery and removal of the plastic product is oriented transversely to the direction of stamping with the stamp 32, which moves the stamping unit 34 vertically in relation to the longitudinal axis 44 of the device as viewed in the line of sight to FIGS. 1 and 2 (see FIG. 2).

As is also to be seen in the illustrations, a support stamp 46 is present which may be moved in the opposite direction simultaneously or desynchronized from the stamp. The support stamp 46 also has a working cylinder which may be operated by hydraulic, pneumatic, or electric means and which has a piston rod 48 on the free end of which is mounted the support plate 50 with the support element 52 positioned on it. In addition, the support stamp 46 also has a housing element 54 which is rigidly connected to a lower frame plate 56. The linear removal movement of the support stamp 46 is also oriented in the direction of the longitudinal axis 44 of the stamping device as a whole. In addition, there are inside the frame 24 four columnar guides 58 which extend in parallel with the longitudinal axis 44 of the stamping device and the free ends of which are mounted in pairs in the upper frame plate 40 and the lower frame plate 56. Both the plate-like stamping unit 34 and the support plate 50 with their rectangular cross-section are mounted by way of guide sleeves 60 on the guide columns 58, so that when the stamps 32 and 46 are moved into and out of position the plates move along with them, while the housing elements 38 and 54 are kept stationary in the frame 24.

As is also to be seen in FIG. 1, in the respective side view the columnar guides 58 are mounted so as to be immediately adjacent to the stamps 32 and 46 so that rigidification of the

stamping device as a total system is largely achieved. The plate-like stamping unit 34 and the support plate 50 are adjacent and face each other and the piston rods 36 and 48 of the stamp 32 and support stamp 46 engage the associated plate 34; 50 and with their housing element 38 or 54 are mounted on the frame 24 so as to be stationary. A guide plate 64 is also present which is rigidly connected to the frame 24 by way of a column suspension 62 having four columns. This guide plate 64 is mounted between plate-like stamping unit 34 and support plate 50 and guides the plastic products as shown by way of example in FIG. 3 for a process of stamping with the identification data inside the frame 24. Additional rigidification of the overall stamping device system is achieved by means of the guide plate 64; in addition, the containers 10 may be guided with precision through the suspended guide plate 64 so that blurred stampings or erroneous stampings may be reliably prevented.

The configuration in question with stamping unit 32 and support stamp 46 may also be reversed inside the device and optionally the support stamp 46 may be designed as another stamping unit if stamping of plastic products on both sides inside the stamping device is desired. The stamping temperature selected for the respective plastic product is to be one which permits a reliable stamping process without damage to the plastic material such as by running or burning. The stamping temperatures may accordingly be varied as a function of the plastic material employed and the strength of the material used for the plastic product.

The stamping device illustrated in FIGS. 1 and 2 may be connected in series to a production machine in particular for a blow-fill-seal process with plastic products and the amounts of product obtained from the production machine may be conducted more or less continuously through the stamping station and provided with stamps. The stamping device may optionally be combined with a punching unit (not shown) which removes a possible edge waste zone from the respective plastic product. The option also exists, however, of mounting the

stamping device between production machine and punching unit and the timing selected may be such that the plastic products produced are punched when the conveyor chain for these products is halted and stamping of the respective plastic product is effected at the preceding station. The possibility also exists of subjecting the stamping to optoelectronic monitoring in order to determine if the stamp is complete and easy to read. Should this quality criterion not be met, the plastic products found not to meet it may be removed as defective elements from subsequent movement in the direction of the packaging station.